

## **REMARKS/ARGUMENTS**

Reexamination of the captioned application is respectfully requested.

### **A. SUMMARY OF THIS AMENDMENT**

By the current amendment, Applicant basically:

1. Editorially amends the specification.
2. Amends claims 1 and 7 (see Section B infra)
3. Add new claims 13-20 (see Section C infra).
4. Amend Fig. 5 and Fig. 6 so that these figures as labeled as "Prior Art".
5. Respectfully traverses all prior art rejections (see Section D infra).

### **B. THE CLAIM AMENDMENTS**

As amended, dependent claim 7 specifies that a ratio ( $W_s/W_b$ ) (now explicitly defined in the claim as being a ratio of the RF electric power ( $W_s$ ) for activating the oxygen-containing gas to the RF electric power ( $W_b$ ) applied to the substrate) is set so that the change rate of the dielectric constant of the insulating film before and after ashing is 10 % or less. Dependent claim 7 is now dependent on new independent claim 13.

Independent claim 1 has been amended so that the limitations of dependent claim 7 are also in independent claim 1. Moreover, independent claim 1 has also been amended to adopted the Examiner's suggestion that claim 1 state that the resist mask is formed on an insulating film.

### **C. THE NEW CLAIMS**

New independent claim 13 is supported by the original independent claim 1 and, in addition, by page 10, lines 10 - 22 of the specification. New dependent claims 16 - 18 are supported by page 11, lines 7 - 15.

New independent claim 19 is a combination of limitations of original independent claim 1 and dependent claim 4. New dependent claim 20 resembles amended dependent claim 7.

#### **D. PATENTABILITY OF THE CLAIMS**

Claims 1, 7, 10 and 12 stand rejected under 35 USC 102(b) as being anticipated U.S. Patent 5,272,417 to Ohmi. Claims 1-6 and 10-12 stand rejected under 35 USC 102(b) as being anticipated U.S. Patent 6,156,629 to Tao et al. Claims 1-6 and 8-12 stand rejected under 35 USC 102(b) as being anticipated U.S. Patent 6,440,864 to Kropewnicki et al. Claims 7 and 8 stand rejected under 35 USC 103(a) as being unpatentable over U.S. Patent 6,440,864 to Kropewnicki et al as applied to claim 1 above and further in view of U.S. Patent 5,453,157 to Jeng. All prior art rejections are respectfully traversed for at least the following reasons.

The inclusion of the subject matter of dependent claim 7 into independent claim 1 defuses rejections of independent claim 1 relative to U.S. Patent 6,156,629 to Tao et al. and U.S. Patent 6,440,864 to Kropewnicki et al., since (correctly) neither of these references were applied to dependent claim 7.

As explained below, Applicant deems that the remaining applied references are also inapplicable to independent claim 1 as amended, as well as to new independent claim 13.

The Office Action points to col. 5, lines 11 - 18, and col. 18, lines 36 - 40, of U.S. Patent 5,272,417 to Ohmi as purportedly establishing that Ohmi teaches ashing without damaging or contaminating the underlying substrate. But protecting the substrate per se is not the same problem as that addressed in the specification, e.g., avoiding bonding that would substantially change a dielectric constant of an insulating film.

In contrast to U.S. Patent 5,272,417 to Ohmi, Applicants protect an interlayer insulating film rather than a substrate generally, and particularly maintain a low dielectric property of the interlayer insulating film. The interlayer insulating film is formed with a particular type of bonding (Si-H or Si-CH<sub>3</sub>) which imparts a low dielectric constant to the interlayer insulating film. But during conventional ashing, these bonds are cut leaving a cut portion of the interlayer insulating film. Also during the ashing, a detrimental Si-OH bonding is generated at the cut portion of the interlayer insulating film. This unfortunate Si-OH bonding undesirably increases the dielectric constant of the interlayer insulating film, increasing wiring capacitance of wires separated by the interlayer insulating film, and thus deleteriously increasing signal delay. See, e.g., the paragraph bridging pages 1 and 2 of the specification.

U.S. Patent 5,272,417 to Ohmi does not address dielectric constant protection of an interlayer insulating film. For example, Ohmi has no explicit indication of avoidance of a change in a dielectric constant of an interlayer insulating film before and after an ashing process. Ohmi certainly does not teach or suggest a change rate of the dielectric constant of the insulating film before and after ashing is 10 % or less.

Moreover, neither U.S. Patent 6,440,864 to Kropewnicki et al. nor U.S. Patent 5,453,157 to Jeng provide a basis for rejection. Neither of these two references teach or suggest avoidance of a change in the dielectric constant of an interlayer insulating film. While Kropewnicki et al. may be concerned with cleaning the residue left by the etching of some portions of the low K dielectric material 45, Kropewnicki does not necessarily protect dielectric properties of the low K dielectric material 45.

The applied references fail to address an ashing operation which consciously prevents a change in the quality of the dielectric constant of an interlayer insulating film during ashing to remove a resist formerly on the interlayer insulating film. Protecting the interlayer insulating film from removal itself is the same thing as preventing a change in

the quality of the dielectric constant. Accordingly, independent claims 1 and 13 and claims 2 - 12 and 14 - 19 dependent thereon are allowable.

Independent claim 19 includes the limitations of dependent claim 4. As such, independent claim 19 requires that the RF electric power (Ws) for activating the oxygen-containing gas be 1000 W or less. Dependent claim 4 stands rejected on the basis of U.S. Patent 6,156,629 to Tao et al. and U.S. Patent 6,440,864 to Kropewnicki et al. This rejection is also respectfully traversed.

U.S. Patent 6,156,629 to Tao et al is devoid of a teaching of removing a resist formed on an interlayer insulating film, and therefore cannot be an anticipation. Neither Tao nor Kropewnicki et al. concern asking of a resist mask.

In view of the foregoing and other considerations, all pending claims are deemed allowable. Therefore, it is respectfully suggested that all prior art rejections be withdrawn and the application passed to issue.

#### **E. MISCELLANEOUS**


The Commissioner is authorized to charge the undersigned's deposit account #14-1140 in whatever amount is necessary for entry of these papers and the continued pendency of the captioned application.

Should the Examiner feel that an interview with the undersigned would facilitate allowance of this application, the Examiner is encouraged to contact the undersigned.

NISHIDA, Takanobu  
Appl. No. 09/986,987  
September 29, 2003

Respectfully submitted,

**NIXON & VANDERHYE P.C.**

By:   
H. Warren Burnam, Jr.  
Reg. No. 29,366

HWB:lsb  
1100 North Glebe Road, 8th Floor  
Arlington, VA 22201-4714  
Telephone: (703) 816-4000  
Facsimile: (703) 816-4100